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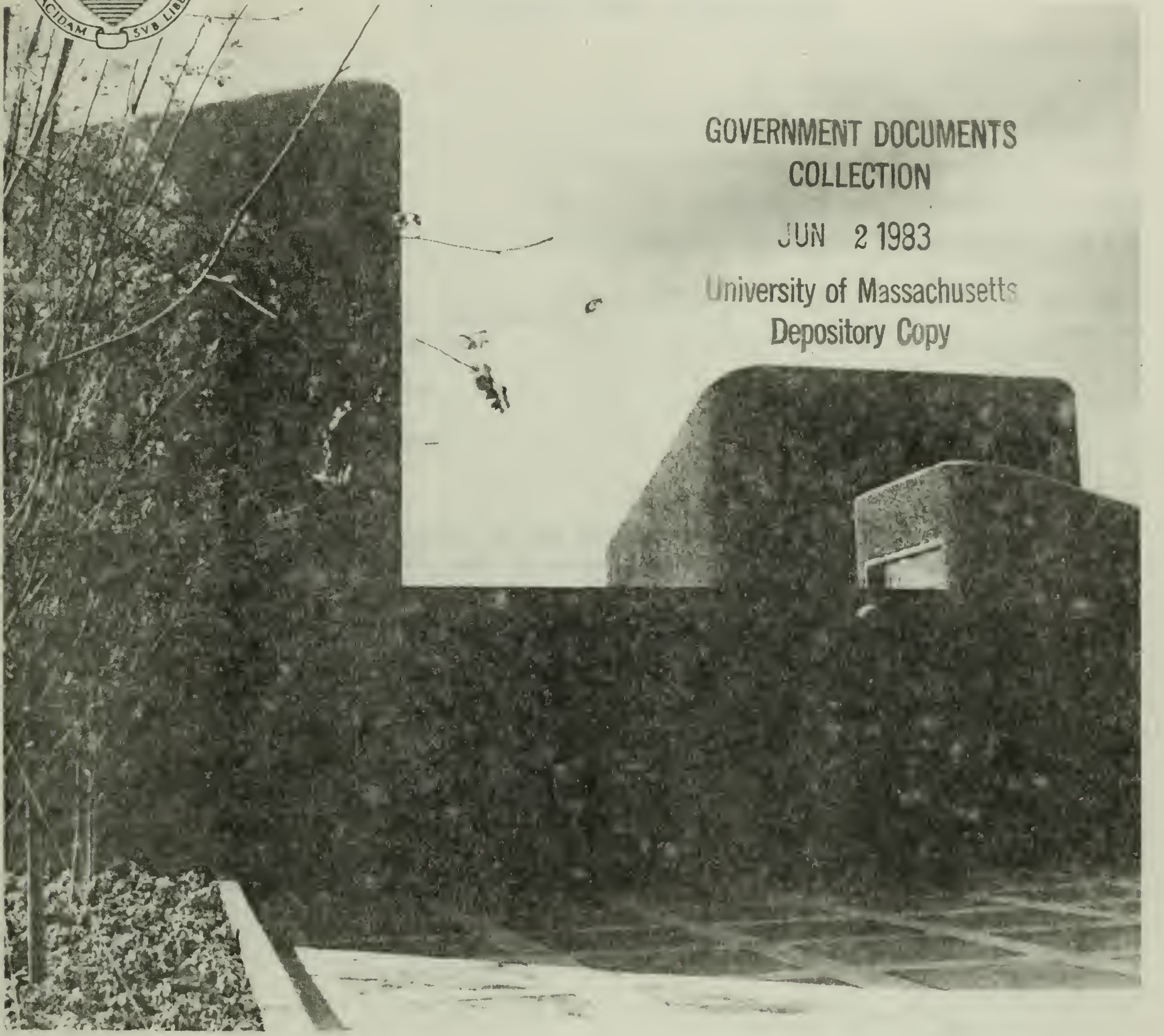
THE COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION
SEWERAGE DIVISION



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62nd
ANNUAL REPORT

FISCAL YEAR ENDING - JUNE 30, 1981

The Commonwealth of Massachusetts
Metropolitan District Commission
20 Somerset Street, Boston 02108

SEWERAGE DIVISION

December 4, 1981

Mr. Terrence J. Geoghegan, Commissioner
Metropolitan District Commission
20 Somerset Street
Boston, Massachusetts 02108

Dear Commissioner Geoghegan:

SUBJECT: Annual Report

The Sixty-Second Annual Report of the Sewerage Division covering the fiscal year ending June 30, 1981 is submitted for your review and information.

This office will be pleased to discuss or amplify the contents of the report to any extent desired.

Respectfully submitted,

Noel D. Baratta

NOEL D. BARATTA, P.E.
Director and Chief Engineer

pjc
PJC:cas

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TABLE OF CONTENTS

ORGANIZATION 1

ADMINISTRATION 2

PLANNING 3

- Contracts 3

COLLECTION SYSTEMS 8

- Pumping Stations (Capacities and Results for Fiscal Year 1981) 8
- Cottage Farm CSO Facility 13

TREATMENT SYSTEMS 14

- Nut Island Sewage Treatment Plant 14
- Deer Island Sewage Treatment Plant 20
- Industrial Waste Program 28

APPENDIX

- Table I - Areas and Population 31
- Table II - To Deer Island (Areas and Populations) 32
- Table III - To Nut Island (Areas and Populations) 33
- Table IV - Metropolitan Sewerage System Location, Length, Size and Connections 34
- Table V - Ratios for Principal and Interest 35
- Table VI - Ratios for Operation and Maintenance 36
- Table VII - Units of Measure 37

ORGANIZATION

The following principals and assistants have been employed during the year:

Joel Barry Chase	Director and Chief Engineer
Noel D. Baratta	Director of Treatment Systems
Ignatius N. Caruso	Director of Collection Systems
George D. Gallagher	Director of Administration
Francis J. Hopcroft	Director of Project Planning and Management

During the past fiscal year four houndred and ninety-nine positions of the five hundred and eighty-eight positions authorized were funded to be filled in the Metropolitan District Commission, Sewerage Division. However, on the average only four hundred and seventeen positions were actually staffed during the fiscal year. The total staffing is assigned to provide collection, transport, pumping, treatment and disposal of wastewater on a continuous twenty-four hour per day basis and was assigned according to the following groupings:

Fourteen (14) positions assigned as supervisory / management.

Sixteen (16) positions assigned as clerical.

Nine (9) positions assigned for design, and planning of all facilities and systems.

Twenty-nine (29) positions assigned to the preparation of facility rehabilitation, contracts, sewer relief design, and industrial programs as staff engineers.

One hundred and forty-two (142) positions assigned to maintain, repair and operate the collection system. This included sewer-lines, pumping stations and CSO facilities.

Two hundred and fifty-four (254) positions assigned as plant engineers, technical , laboratory, operational and maintenance personnel within the wastewater treatment service.

Twenty (20) positions assigned to industrial waste programs as staff engineers and chemists.

ADMINISTRATION

The Director of the Sewerage Division and Chief Sewerage Engineer has charge of the design and construction of new works, and the maintenance and operation of all the works controlled by the Metropolitan District Commission for removing sewage from forty-three municipalities comprising the Metropolitan Sewerage District.

The work includes the maintenance and operation of ten (10) pumping stations, two (2) storm water detention and chlorination plants, two (2) waste water treatment plants, four (4) pretreatment headworks and 228.01 miles of Metropolitan Sewers receiving the discharge from 5,344.67 miles of town and city sewers at 1,805 points, together with the care and routine work of inspecting, cleaning and maintaining sewers, siphons, tide gates, outfall sewers, the inspecting of connections to Metropolitan Sewers, and the care of pumping stations, treatment plant, other buildings and grounds.

Under the Director and Chief Engineer are four (4) Sub-Directors who are responsible for a separate segment of the Division, and report directly to Director and Chief Engineer. The Directors are as follows:

Director of Treatment Systems is responsible for the operation of both treatment facilities, the Industrial Waste Program, Monitoring Program, and Septage Program.

Director of Collection Systems takes the responsibility for the operation and maintenance of ten (10) pumping stations, two (2) CSO facilities, and 228.01 miles of sewer lines.

Director of Administration is responsible for the Division's budget and dispensing of funds to various payable accounts. This section also has the responsibility of filling vacant positions and posting job vacancies within the Division.

Director of Project Planning and Management, has the job duty to oversee the Division's contracts, rehabilitation of facilities, retrofit design work, and public participation of Division projects.

PROJECT PLANNING AND MANAGEMENT

This is the newest part of the Division, it was formerly known as the Environmental Planning Office.

It is composed of engineers and draftsmen who are responsible for facility rehabilitation, contracts, sewer relief design, and maintenance work done by plant personnel and outside contractors.

CONTRACTS MADE OR IN FORCE FOR THE FISCAL YEAR ENDING JUNE 30, 1981

PAB R-947

Chlorination System Study, Nut Island Sewage
Treatment Plant, Quincy, Massachusetts

This consultant contract with Perkins/Jordan, Reading, Massachusetts was signed by the Commission on June 11, 1981 for a study cost not to exceed $35,524 and was not completed at the end of the fiscal year 1981.

PAB R-948

Instrumentation Study, All Division Facilities

This consultant contract with Russell H. Babcock P. E. was signed by the Commission April 9, 1981 for a study cost not to exceed $39,185.00 and was not completed at the end of the fiscal year 1981.

PAB R-944

E.P. Toxicity Scan on Grit Screenings and Sludge at
Deer Island and Nut Island Sewage Treatment Plants
and the Clinton Wastewater Facility

This consultant contract with the Interex Corporation was signed on April 16, 1981 by the Commission for Study cost not to exceed $4,200.00 and was completed at a total cost of $4,113.00 June 30, 1981.

Contract No. R108171/00

Establish Municipal/Industrial Permit System and to Conduct Industrial Waste Survey and a Pretreatment Program and to Establish and Develop User Charge and Industrial Cost Recovery Systems to Comply with Federal Law and Related Rules and Regulations

This contract was awarded to Black and Veatch, Consulting Engineers of Kansas City, Mo. on July 13, 1978 at a bid price of $2,197,500.00 which was amended on February 22, 1979 to read $2,182,700.00. It was signed on August 3, 1978. Notice to proceed was given September 8, 1978. The contract was not completed at the end of the fiscal year 1981.

Contract No. R108255/00

Physical Survey of Portions of M.D.C. Interceptor System Tributary to Deer Island Sewage Treatment Plant

This contract was awarded to Camp Dresser & McKee, Inc. of Boston, Massachusetts on April 23, 1980 at a negotiated price of $150,937.00. Notice to proceed was given May 19, 1980. The contract was not completed at the end of the fiscal year 1981.

Design of Contract No. S76-1

Load Lugger System, Three Headworks

This contract was awarded to Whitman and Howard Inc. Wellesley, on June 19, 1980 at a total design cost not to exceed $11,500.00. The contract was signed September 25, 1980 and was not completed at the end of the fiscal year 1981.

Contract No. S77-1

Installation of Twin 54" Sewer Lines, Weymouth Fore River

This contract was awarded to J.F. White Contracting Company, Newton, Massachusetts on December 1, 1977 at a bid price of $3,932,610.00. It was signed on January 12, 1978 and not completed at the end of the fiscal year 1981.

Design of Contract No. S77-14

Replacement of Raw Sludge Lines and Pumps, Nut Island Sewage Treatment Plant, Quincy, Mass.

This contract was awarded to Hayden, Harding and Buchanan on July 17, 1980. The design cost was not to exceed $29,600.00. It was not completed at the end of the fiscal year 1981.

Contract No. S78-1

Underwater Services, Weymouth-Fore River, Weymouth and Quincy
Massachusetts

This contract was awarded to Inner Space Services of Methuen, Massachusetts on August 24, 1978 at a bid price of $57,999.75. It was signed on November 9, 1978 and was not completed at the end of the fiscal year 1981.

Contract No. S78-21 B

Installation of a Sluice Gate and Operator, Quincy Pumping
Station Quincy, Massachusetts

This contract was awarded to the Normac Company, Inc. of Westwood, Massachusetts on January 10, 1980, at a bid price of $58,798.00. It was signed on January 31, 1980 and was accepted as complete on September 8, 1980 at a cost of $58,798.00.

Design of Contract No. S79-6

Screening Container System, All Sewage Pumping Stations

This contract was awarded to SEA Consultants on September 18, 1980, at a total design cost not to exceed $39,952.00. The contract was signed on October 17, 1980 and was not completed at the end of the fiscal year 1981.

Contract No. S79-7

Roof Repairs Columbia Park Headworks, Boston, Mass.

This contract was awarded to John F. Shea Comapny, Inc. on June 26, 1980, at a bid price of $29,319.00. It was signed July 10, 1980 and accepted as complete on September 11, 1980 at a total cost of $29,319.00.

Design of Contract No. S79-10

Shaft Overflow Containment, Deer Island Sewage Treatment Plant
Boston, Massachusetts

This contract was awarded to Keyes Associates on June 19, 1980 at a design cost not to exceed $15,000.00. The contract was signed July 17, 1980 and was not completed at the end of the fiscal year 1981.

Design of Contract No. S79-17

Effluent Water Filtration System, Nut Island Sewage
Treatment Plant, Quincy, Mass.

This contract was awarded to SEA Consultants Inc. at a design cost not to exceed $12,130.00 on July 9, 1979. The contract was signed on July 24, 1980 and was not completed at the end of the fiscal year, 1981.

Design of Contract No. S79-26

Boiler Replacement, Nut Island Sewage Treatment Plant
Quincy, Mass.

This contract was awarded to Samuel Ussia and Associates, Brookline, Mass. on June 26, 1980, at a design cost not to exceed $20,250.00. The contract was signed on June, 1980 and was not completed at the end of the fiscal year, 1981.

Contract No. S80-4

Repair to the Pump Drive Speed Reducer at the Charlestown
Pumping Station, Charlestown, Mass.

This contract was awarded October 9, 1980 to Mills Engineering Company Inc., Needham Heights at a bid price of $2,425.00. It was signed on January 8, 1981 and was accepted as complete January 16, 1981 at a cost of $2,425.00.

Contract No. S80-5

Cleaning Digester #4, Nut Island Sewage Treatment Plant
Quincy, Massachusetts

This contract was awarded on January 5, 1981 to P.R. Johnson, Inc. Bedford, Mass. at a bid price of $51,280.00. It was signed on January 8, 1981 and accepted as complete on February 3, 1981 at a cost of $51,280.00.

Contract No. S80-6

Emergency Repairs to the Charlestown Pumping Station
Charlestown, Mass.

This contract was awarded on an emergency basis on December 30, 1980 to the Perini Corporation, Framingham, Mass. at an up-set limit of $250,000.00. It was signed December 23, 1980 and was not completed at the end of the fiscal year 1981.

Contract No. S80-7

Emergency Pump Replacement, Reading Pumping Station,
Wakefield, Mass.

This contract was awarded on an emergency basis to P.R. Johnson,Inc., Bedford,Mass. on January 28, 1981 at a bid price of $6,300.00. It was signed February 5,1981 and was accepted as complete on January 6,1981 at a total cost of $6,300.00.

Contract No. S80-8

Emergency Pipe Repair Section 134, Framingham, Mass.

This contract was awarded on December 2, 1981, on an emergency basis to Fantini Company Inc., Framingham, Mass. at a bid price of $26,230.00. The contract was signed on December 31, 1980, and accepted as complete on December 12, 1980.

PAB R-874

Old Stony Brook Conduit Connection to the Boston Main Drainage Relief Sewer and the Goldsmith Brook Conduit Relocation, also, Assistance to the MBTA for Design of a Force Main Crossing the Southwest Corridor at Gordon Street.

This contract was awarded July 2, 1980 to Metcalf and Eddy Inc., Boston, Mass. at a design cost of $267,579.00 which was amended on April 2, 1981 to read $273,346.00. It was not completed at the end of fiscal year 1981.

PAB R-930

Laboratory Services for Industrial Waste

This consultant contract with the G.C.A. Corporation, Bedford, Massachusetts was signed by the Commission May 14, 1981 for a study cost not to exceed $399,880.00. It was not completed at the end of the fiscal year 1981.

COLLECTION SYSTEMS

Average Daily Volume of Sewage Lifted at Each of the Ten Metropolitan Sewerage Pumping Stations During the Year, as Compared with the Corresponding Volumes for the Previous Year

	Average Daily Pumpage			
PUMPING STATION	1980 Gallons	1981 Gallons	Difference	During Year Per Cent Increase
Alewife Brook	10,190,000	9,860,000	330,000	3.2 *
Braintree-Weymouth	19,880,000	16,030,000	3,850,000	19.4 *
Charlestown	26,160,000	28,100,000	1,940,000	6.9
East Boston	4,930,000	5,860,000	930,000	15.9
East Boston Electric	No Meter	—		
Hingham	500,000	350,000	150,000	30.0 *
Hough's Neck	No Meter	—		
Quincy	7,880,000	6,150,000	1,730,000	22.0 *
Reading	2,270,000	2,220,000	50,000	2.2 *
Squantum	780,000	780,000	—	—

* Decreases

METROPOLITAN SEWERS

Sewers in Operation and Their Connections

At the end of the year there was a total of 228.01 miles of Metropolitan Sewers in operation with the Sewerage District. Of this total, 12.88 miles of sewer, along with the Quincy Pumping Station, have been purchased from cities and towns of the district and the U. S. Navy.* The remaining 215.13 miles of sewers and other works have been constructed by the Metropolitan Boards.

The locations, lengths and sizes of these sewers are given in TABLE IV, together with other data referring to the public and special connections with the system.

* Hingham Force Main

METROPOLITAN SEWERAGE DISTRICT

Total Population	Miles of Local Sewer Connected	Estimated Population Contributing Sewage	Ratio of Contributing Population to Total Population (Per Cent)	Connections Made with Metropolitan Sewers Public	Special	MDC
2,180,031	5,344.67	1,881,805	86.3	866	897	42

MATERIALS INTERCEPTED AT THE SCREENS

The material removed from sewage at the screens of the Metropolitan Sewerage Facilities, consisting of rags, paper and floating materials has, during the year, amounted to 742.7 cubic yards.

METROPOLITAN SEWERAGE OUTFALLS

The Metropolitan Sewerage District has outfalls located in Boston Harbor at ten points, five of which may discharge sewage from Deer Island, and five from Nut Island. Of the five from Nut Island, one is for digested sludge and the others are for effluent.

The two main outfalls from Deer Island discharge near Deer Island Light. The other three Deer Island outfalls are for temporary use only.

The two main 60" outfalls from Nut Island Treatment Plant extend for a distance of about 6,000 ft. from the Nut Island shore; the third, a 60" outfall, extends about 1,400 ft. from the shore; the fourth, a 60" emergency outfall, extends about 480 ft. from the shore; the fifth, a 12" outfall used for sludge from the treatment plant, discharges at President Roads at the northeasterly end of Long Island, a distance of about 4.2 miles.

The average flow from the Deer Island Treatment Plant and its outfalls has been 282,000,000 gallons of sewage per 24 hours, with a maximum flow of 712,000,000 gallons per 24 hours.

The average flow from the Nut Island Treatment Plant and its outfalls has been 98,000,000 gallons of sewage per 24 hours, with a maximum flow of 260,000,000 gallons per 24 hours.

METROPOLITAN SEWERAGE SYSTEM

PUMPING SERVICE

Capacities and Results for Fiscal Year 1981

Alewife Brook Pumping Station:

At this station, there are three primary, 30" mixed flow pumps driven by 440 volt, three phase, 100 hp, General Electric variable speed motors and one secondary 20" mixed flow pump driven by a 440 volt, three phase, 50 hp, squirrel cage motor.

Contract capacity of 30" pumps	26 mgd at 15' head
Contract capacity of 20" pump	12 mgd at 17' head
Average quantity pumped per day	9,860,000 gallons
Maximum quantity pumped per day	33,250,000 gallons

Alternating current is furnished by the Boston Edison Company and the Town of Belmont.

Braintree-Weymouth Pumping Station:

At this station, there are three diesel engine driven horizontal centrifugal pumps. The Waukesha diesel driven pump is capable of lifting 20 mgd against a head of 42 feet, the Enterprise diesel driven pump is capable of lifting 20 mgd against a head of 40 feet and a Chicago pneumatic diesel driven pump is capable of lifting 20 mgd against a head of 42 feet.

Average quantity pumped per day	16,030,000 gallons
Maximum quantity pumped per day	40,750,000 gallons

Charlestown Pumping Station:

At this station, there are three submerged centrifugal pumps being driven by Fairbanks-Morse diesel engines.

Contract capacity of one diesel engine driven pump	60 mgd at 18' head
Contract capacity of two diesel engine driven pumps	45 mgd at 11' head
Average quantity raised per day	28,100,000 gallons
Maximum quantity raised per day	71,840,000 gallons

East Boston Pumping Station:

At this station, there are four submerged centrifugal pumps, three operable, one driven by an Enterprise diesel engine, one by a uniflow type steam engine, and one by a triple expansion steam engine of the Reynolds-Corliss type. The other triple expansion steam engine is being utilized for parts and is not operational at this time.

Contract capacity of diesel engine driven pump	100 mgd with 19' head
Contract capacity of uniflow engine driven pump	60 mgd with 24' head
Contract capacity of triple expansion engine driven pumps	45 mgd with 19' head
Average quantity pumped per day	5,360,000 gallons
Maximum quantity pumped per day	78,000,000 gallons

East Boston Electric Pumping Station:

This station is equipped with one 400 hp, 396 rpm, General Electric motor that drives a 50 mgd vertical centrifugal non-clog DeLaval pump at a total head of 35.4 feet, and with one 600 hp, 320 rpm, General Electric motor that drives a 75 mgd vertical centrifugal, non-clog DeLaval pump at a total head of 38.5 feet. Alternating current, 4,160 volt, three phase, is furnished by the Boston Edison Company. This station had not been used since 1974, however, during this past year, the 50 mgd pump was reactivated to provide for emergency flow relief during storm flow conditions.

Hingham Pumping Station:

This station is equipped with three Fairbanks-Morse centrifugal pumps driven by 60 hp, Fairbanks-Morse induction type, wound rotor, variable speed motor and its pumping range is from 375 gpm at a head of 35 feet, to 1,000 gpm at a head of 126 feet. Alternating current, 440 volt, three phase, is supplied by the Town of Hingham.

Average quantity pumped per day	350,000 gallons
Maximum quantity pumped per day	3,016,000 gallons

Hough's Neck Pumping Station:

This station is equipped with two 6" vertical centrifugal pumps capable of pumping 1,000 gpm at a head of 20 feet. The pumps are driven by two 10 hp 220/440 volt, three phase motors. Alternating current 440 volt, three phase is furnished by the Nut Island Sewage Treatment Plant.

Quincy Pumping Station:

The plant at this station consists of two Fairbanks-Morse centrifugal pumps driven by two Fairbanks-Morse diesel engines and one Worthington centrifugal pump driven by an Enterprise Diesel engine.

Contract capacity of Fairbanks-Morse pumps	20 mgd at a head of 33'
Contract capacity of Worthington pump	12 mgd at a head of 26'
Average quantity raised per day	6,150,000 gallons
Maximum quantity raised per day	19,350,000 gallons

Reading Pumping Station:

At this station, there are two submerged centrifugal pumps of 4 mgd capacity at a 75 foot head, one driven by a General Electric 100 hp, 440 volt, three phase electric motor and the other driven either by a Fairbanks-Morse 100 hp 400 volt, three phase electric motor or by a standby Fairbanks-Morse diesel engine. Alternating current is furnished by the Town of Reading.

Average quantity pumped per day	2,220,000 gallons
Maximum quantity pumped per day	4,010,000 gallons

Squantum Pumping Station:

At this station, there are two centrifugal pumps, each capable of pumping 2,800 gpm at a head of 46 feet. One is driven by 60 hp, three phase motor and the other by a 60 hp, three phase motor, or in emergency, by an 80 H. P., Fairbanks-Morse diesel engine. Alternating current is furnished by the Massachusetts Electric Company.

Average quantity pumped per day	780,000 gallons
Maximum quantity pumped per day	4,820,000 gallons

SUMMARY OF PLANT OPERATING DATA

COTTAGE FARM STORM WATER DETENTION AND CHLORINATION STATION

From July 1, 1980 to June 30, 1981

The Cottage Farm Storm Water Detention and Chlorination Station was activated May 1971, and is located on the Cambridge side of the Charles River, just west of the Boston University Bridge. Dry weather flows and minor storm flows up to the capacity of the sewer line itself normally pass through the sewer line directly to Ward Street Headworks and then to Deer Island Sewage Treatment Plant. Under storm conditions, when this sewer line capacity is exceeded, flow is retained at the Cottage Farm Station up to a volume of 1.3 million gallons. Any amount in excess of 1.3 million gallons received by the station is screened and chlorinated and discharged to the Charles River. The 1.3 million gallons retained by the station is then pumped into the Ward Street sewer line for future treatment at Deer Island Sewage Treatment Plant, once the flow recedes and sewer line capacity is available to do so. The design flow of the Cottage Farm Storm Water Detention and Chlorination Station is 233.1 million gallons per day.

No. of Times Plant was Activated	25
Total Amount Received by Station	995.20 Million Gallons
No. of Times Overflow Occurred into the Charles River	22
Total Amount of Overflow into the Charles River	922.32 Million Gallons
Total Amount of Sodium Hypochlorite Used	18,150.00 Gallons
Minimum Recorded Rainfall	0.20 Inches
Maximum Recorded Rainfall	2.50 Inches
Average Rainfall	1.07 Inches

TYPICAL OPERATIONAL DATA*

BOD, 5 Day

Influent - ppm	170.97
Effluent - ppm	110.0
Removal, %	35.7%

Suspended Solids

Influent - ppm	172.01
Effluent - ppm	103.64
Removal, %	39.7%

Settleable Solids

Influent - ml/l	2.02
Effluent - ml/l	0.88
Removal, %	56.4%

Bacterial Concentration (Total Coliform)

Influent - MF/100 ml	22.25×10^6
Effluent - MF/100 ml	295.83
Removal, %	99.99%

* Based on Composite Samples From Actual Discharges

METROPOLITAN DISTRICT COMMISSION

SEWERAGE DIVISION

NUT ISLAND SEWAGE TREATMENT PLANT

ANNUAL REPORT

July 1, 1980 to June 30, 1981

General Information

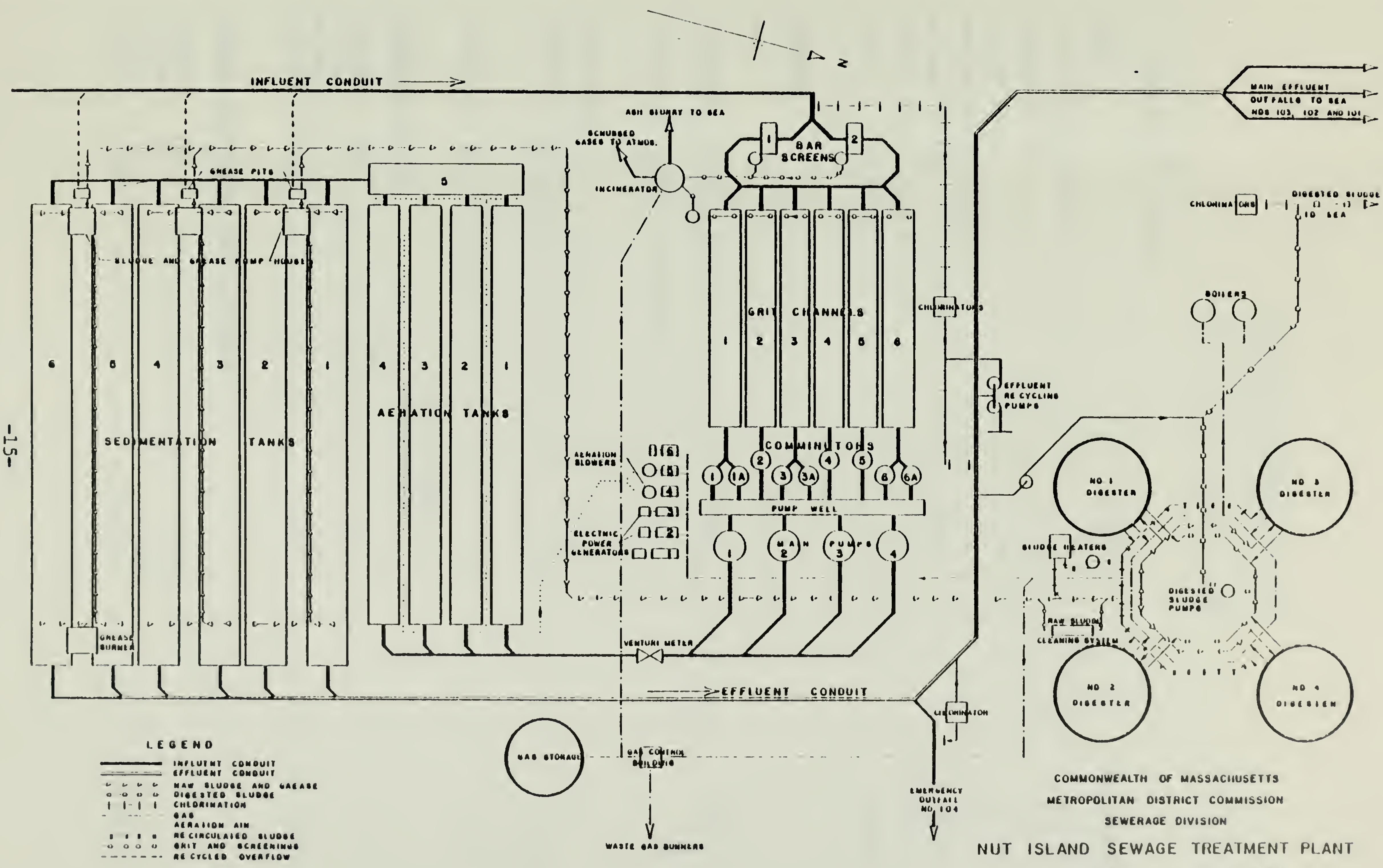
The Nut Island Sewage Treatment Plant, in operation since 1952, presently serves twenty-one cities and towns, including portions of Boston, Brookline, Hingham, Milton and Newton, covering an area of 236.83 square miles, having a total population of 789,256 and a contributing population of 658,859. Five Metropolitan District Commission pumping stations are located throughout the contributing area.

Designed to remove floating solids and grease and reduce the amount of suspended solids to such an extent as can be done in sedimentation tanks having 90 minutes' detention, the plant has been operating effectively as the first completed treatment unit in the Metropolitan District Commission Sewerage Division.

The treatment processes include pre-chlorination, coarse screening and grit removal for incineration, a pre-aeration of the influent for a 20-minute period, primary sedimentation and post-chlorination of plant effluent prior to discharge through 60" outfall pipes some 6,000 feet off shore in deep tidal water.

Treatment of the raw sludge is accomplished by modified high rate digestion. Two primary tanks, which have fixed covers, and one primary tank—with floating cover—are equipped to maintain continuous recirculation of the tank contents. A secondary digestion tank of the same capacity is equipped with a floating cover and supernatant draw-off. The digested sludge is disposed of through a 12" submarine pipe line which extends a distance of 4.2 miles from the treatment plant into deep tidal water on the south side of President Roads.

Gas produced by the digestion process is the principal source of fuel for all plant power and heating purposes.



COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT COMMISSION
SEWERAGE DIVISION

NUT ISLAND SEWAGE TREATMENT PLANT

FLOW DIAGRAM

SUMMARY OF OPERATIONAL DATA

July 1, 1980 to June 30, 1981

I - SEWAGE FLOW PROCESS

Flows	MGD	Cu. Meters/day
Minimun Hourly Rate	50	189.2K
Minimum 24 Hour	50.26	190.2K
Average Daily	98	370.9K
Average Daily (Design)	112	424K
Maximum 24 Hour	250	946.2K
Maximum Hourly Rate (Design)	230	871K
Total for Year - MG	35,770 M.Gal.	135.3M.Cu.Meter

Removals

Grit:

Removed, Cu. Ft., total	34,827	986
Cu. Ft./MG	0.97	7.25 Cu. Meters/ M. Cu. Meters
Volatile Content as collected, %	19	

Screenings:

Removed, Cu. Ft., total	31,501	892
Cu. Ft./MG	0.88	6.58 Cu. Meters/ M. Cu. Meters
Incinerator Ash, % Volatile	0.0	0.0

Suspended Solids	DAILY AVERAGE	
Influent - ppm	156	
Effluent - ppm	68	
Removal, %	56.4	
Removal, lbs/day	71,924	32,624 kg

Grease, Petroleum, Ether Solubles		
Influent - ppm	54.2	
Effluent - ppm	35.8	
Removal, %	33.9	
Removal, lbs/day	15,038	6,821 kg

DAILY AVERAGE

		Cu. Meters/day
Settleable Solids		
Influent - ml/l	10.1	
Effluent - ml/l	0.9	
Removal, %	91.1	
BOD, 5 Day		
Influent - ppm	136	
Effluent - ppm	108	
Removal, %	20.6	
Removal, lbs/day	22,884	10,380 kg
Bacterial Concentration		
Influent - Total Coliforms/100 ml	31,000,000	
Effluent - Total Coliforms/100 ml	104	
%, Kill	99.999	
Chlorine Requirement		
Influent - ppm	5.6	
Chlorine Usage		
Applied - ppm (1)	8.3	
Average Daily, tons (1)	3.4	3,084 kg
Total for year, tons (1)	1,652	1,500 kg
Chlorine Residual		
Effluent - ppm	2.2	

II - SLUDGE COLLECTION AND DIGESTION PROCESSES

DAILY AVERAGE

Raw Sludge

Total solids content % after primary settling	6.2	
Added to Digesters		
1000 gallons	87,694	332K Cu. Meters
1000 dry lbs	45,344	20,568K kg
Volatile solids content, %	76.2	
Volatile solids content, 1000 dry lbs	34,552	15,672K kg
Grease, skimmings excluded, pet. ether solubles Content, %	15.6	
Added to Digester		
1000 dry lbs	7,072	3,208K kg
Alkalinity	800	
pH	5.4	
Sand		
Content, %	15.5	
Added to Digester		
1000 dry lbs	7,027	3,187K kg

Digested Sludge

Total solids content, %	2.23	
Withdrawn, 1000 gals	88,636	335K Cu. Meters
Withdrawn, 1000 lbs	16,484	7,477 kg
Volatile solids content, %	53.6	
Withdrawn, 1000 dry lbs	8,835	4,008 kg
Grease, pet. ether soluble contents, %	6.7	
Withdrawn, 1000 lbs	1,104	501 kg
Sand content, %	31.5	
Withdrawn, 1000 lbs	5,192	2,355 kg
Alkalinity	2,600	
pH	7.10	

DAILY AVERAGE

Digestion Efficiency (based on standard rate single stage)

Reduction

Total solids destroyed, %	49.6	
1000 dry lbs	22,491	10,202K kg
Volatile solids destroyed, %	65.1	

Digester Scum Withdrawn

Solids, 1000 dry lbs	1,207	547K kg
Grease, 1000 dry lbs	232	105K kg
Non-saponifiable grease, 1000 dry lbs	81	36K kg

Digester Loadings (based on two primary tanks; 4.6 M. Gal. capacity)

Detention Time, days	22
Unit loading rate, dry lbs/cu.ft./day	0.174
kg/cu.meter/day	2.80

Digester Sludge Gas

Produced, total 1000 cu. ft.	302,505
cu. meters	8,566
Cu. ft./lb solid added	6.67
Cu. meters/kg	0.42
Cu. ft./lb volatile added	8.76
Cu. meters/kg	0.54
Cu. ft./lb solid destroyed	13.45
Cu. meters/kg	0.84
Quality Methane, %	60.6
Carbon Dioxide, %	39.4
Hydrogen Sulphide, grs./100 cu.ft.	30

Soda Ash Usage

Total for year (tons)	11

(1) Total Cl_2 usage includes post, prechlorination and digested sludge Harbor Line.

METROPOLITAN DISTRICT COMMISSION

SEWERAGE DIVISION

DEER ISLAND SEWAGE TREATMENT PLANT

ANNUAL REPORT

July 1, 1980 to June 30, 1981

General Information

The Deer Island Treatment Plant, in operation since June 1968, serves 22 communities and portions of Boston, Brookline, Newton, and Milton. The area served by this treatment plant is 168.03 square miles with a total population of 1,390,775 and a contributing population of 1,293,788. Five Metropolitan District Commission pumping stations are located throughout the contributing area.

This primary pollution control facility has been a major factor in improving the water quality in Boston Harbor by effectively accomplishing the design criteria of primary sedimentation and post-chlorination of clarified sewage effluent.

As shown in the diagram on the following page, the Deer Island Facilities includes three (3) remote headworks, located respectively in Chelsea, Roxbury and South Boston, and connected to the Deer Island main pumping station by two deep rock tunnels. The tunnel from the Chelsea Creek Headworks is approximately four miles and the one from Ward Street and Columbus Park Headworks is approximately seven miles long. An additional Facility, the Winthrop Terminal Facility, located on the main plant site, provides sewerage service for local areas and is connected to the Deer Island Plant through a separate direct pump discharge.

The treatment processes include screening and grit removal (at all headworks); aeration of the influent for a ten minute period; primary sedimentation and post-chlorination of the plant effluent prior to ocean discharge through two long submerged outfalls.

Treatment of raw sludge is accomplished by separate sludge thickening prior to high rate digestion. Three primary digesters, equipped with fixed covers, external heaters, and draft tube mixers, have a sludge recirculation system via a common manifold. A fourth digester, also equipped with a fixed cover and a separate liquid recirculation system serves as a storage tank, receiving all primary digested solids and overflow to allow controlled discharge of digested material to sea only during the periods of outgoing tides.

Plant design and construction were under the jurisdiction of the Metropolitan District Commission Engineering Division. The Metropolitan District Commission Sewerage Division is responsible for plant operation and maintenance.

FISCAL 1981

HIGHLIGHTS OF MAJOR ACTIVITIES

This is the thirteenth full year of operation.

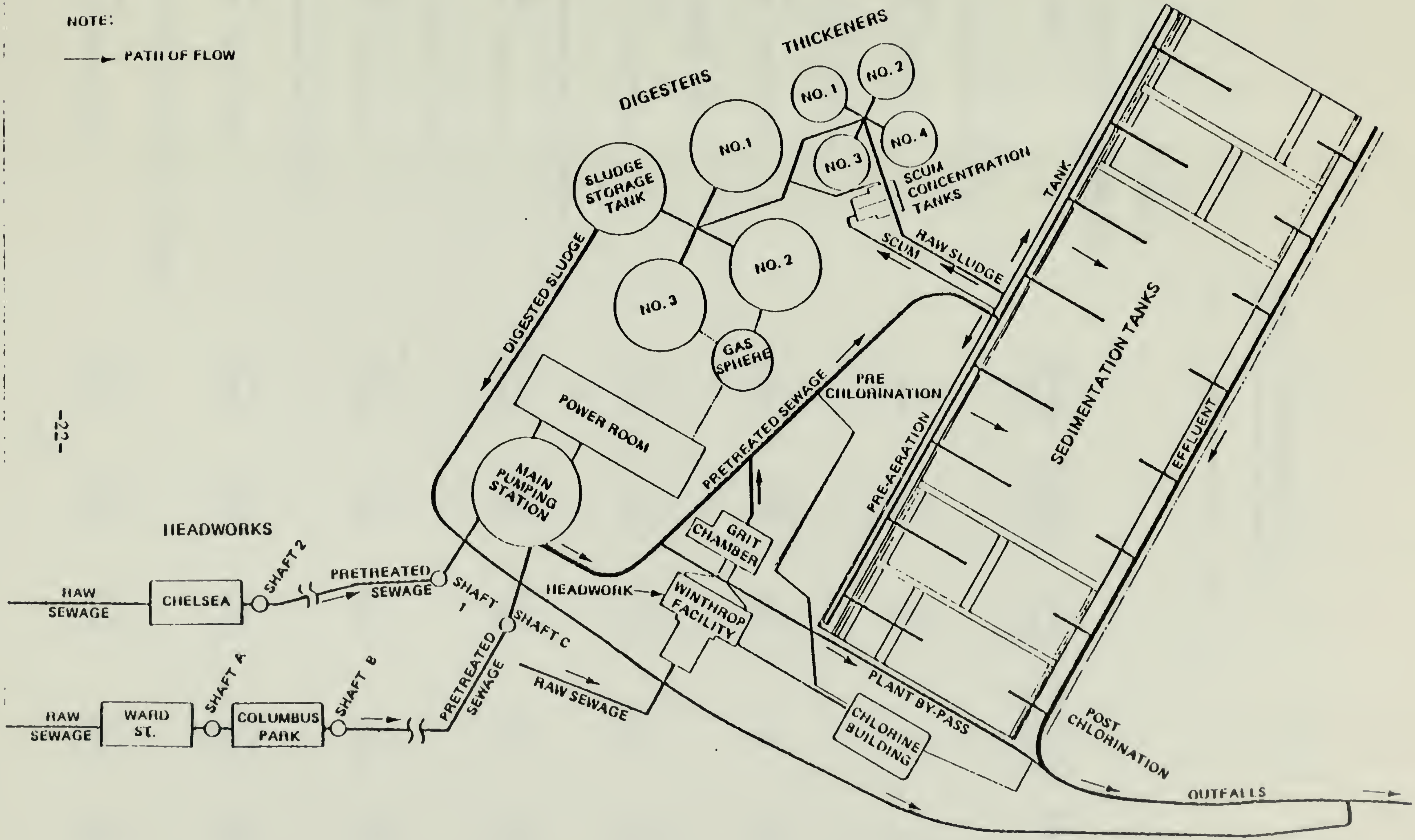
The use of effluent as process water has been continuous for this year.

No. 1 Digester has been secured for inspection, cleaning and maintenance.

Personnel staffing for the 24 hour/day continuous operation of the plant facilities are as follows:

OPERATIONS	Pre-Treatment (Headworks):	50
	Primary Treatment (Main Plant):	27
	Power & Pumping (Main Plant):	19
MAINTENANCE	Treatment Units:	30
	Power & Pumping Units:	31
OFFICE	Clerical:	1
	Laboratory:	5
	Administration & Engineering:	5
TOTAL	As of June 30, 1981	168

Approximately 1100 visitors were given conducted tours of the plant this year. Any organization is welcome and requests from groups representing local, national and international associations are becoming more frequent as the concern for the environment grows.


NOTE:
PATH OF FLOW
THICKENERS
NO. 1
NO. 2
NO. 3
NO. 4
DIGESTERS
NO.1
NO. 2
NO. 3
SLUDGE STORAGE TANK
GAS SPHERE
SCUM CONCENTRATION TANKS
TANK
SCUM
RAW SLUDGE
SEDIMENTATION TANKS
EFFLUENT
DIGESTED SLUDGE
POWER ROOM
PRE CHLORINATION
PRETREATED SEWAGE
PRE-AERATION
MAIN PUMPING STATION
GRIT CHAMBER
HEADWORKS
RAW SEWAGE
CHELSEA
SHAFT 2
PRETREATED SEWAGE
SHAFT 1
HEADWORK
WINTHROP FACILITY
SHAFT C
RAW SEWAGE
WARD ST.
SHAFT A
COLUMBUS PARK
SHAFT B
PRETREATED SEWAGE
RAW SEWAGE
PLANT BY-PASS
CHLORINE BUILDING
POST CHLORINATION
OUTFALLS

SUMMARY OF OPERATIONAL DATA

July 1, 1980 to June 30, 1981

I - SEWAGE FLOW PROCESS:

Headworks - Pretreatment

Flows	Chelsea Creek	Columbus Park	Ward Street	Winthrop Facility	Total
Minimum Hourly Rate					
MGD	50	20	25	0	95
Cu. Meters/day	189K	76K	95K	0	360
Minimum 24 Hour					
MGD	67	28	41	3	139
Cu. Meters/day	254K	106K	155K	11K	526
Average Daily					
MGD	112	63	95	11	281
Cu. Meters/day	424K	238K	359K	42K	1063K
Average Daily (Design)					
MGD	(140)	(66)	(113)	(24)	(343)
Cu. Meters/day	530K	250K	428K	91K	1298K
Maximum 24 Hour					
MGD	207	86	144	95	532
Cu. Meters/day	783K	325K	545K	359K	2012
Maximum Hourly Rate					
MGD	280	150	225	120	775
Cu. Meters/day	1060K	568K	851K	454K	2933
Maximum Hourly Rate (Design)					
MGD	(350)	(182)	(256)	(60)	848
Cu. Meters/day	1325K	689K	969K	227K	3210

FLOWS	Chelsea Creek	Columbus Park	Ward Street	Winthrop Facility	Total
Total for Year - Mil. Gal.	40,950	23,019	34,720	4,059	102,718
Cu. Meters	155M	87M	131M	15M	389M

Removals

Grit:

	Chelsea Creek	Columbus Park	Ward Street	Winthrop Facility	Total
Cu. Ft.	13,647	3,845	16,155	2,129	35,776
Cu. Meters	386	109	457	60	1,013
Cu. Ft./M. Gal.	0.33	0.17	0.46	0.52	0.35
Cu. Meters/M. Cu. Met.	2.49	1.25	3.49	4.00	2.60

Screenings:

	Chelsea Creek	Columbus Park	Ward Street	Winthrop Facility	Total
Cu. Ft.	35,583	11,010	37,595	5,257	89,445
Cu. Meters	1,008	312	1,065	149	2,533
Cu. Ft./M. Gal.	0.87	0.48	1.08	1.30*	0.87
Cu. Meters/M. Cu. Met.	6.59	3.59	8.13	9.93*	6.50

Main Plant - Primary Treatment:

Flows	MGD	Cu. Meters/day
Minimum Hourly Rate	160	605K
Minimum 24 Hour	196	742K
Average Daily	281	1063K
Average Daily (Design)	(343)	1298K
Maximum 24 Hour	466	1763K
Maximum Hourly Rate	620	2346K
Maximum Hourly Rate (Design)	(925)	3500K
Total for Year	102,718 M. Gal.	389 M. Cu. Meters

* Includes amounts from dewatering sed. tanks

K - denotes unites of 10^3

M - denotes unites of 10^6

DAILY AVERAGE

Suspended Solids

Influent - ppm	154	
Effluent - ppm	78	
Removal, %	49	
Removal, lbs/day	177,900	80,690 kg

Settleable Solids

Influent - ml/l	5.4
Effluent - ml/l	1.0
Removal, %	81

BOD, 5 Day

Influent - ppm	140	
Effluent - ppm	98	
Removal, %	30	
Removal, lbs/day	98,300	44,600 kg

Bacterial Concentration

Influent - Total Coliforms/100 ml	21,000,000
Effluent - Total Coliforms/100 ml	466
% Kill	99.998

Chlorine Requirement

Influent - ppm	4.4

Note: The chlorine requirement fluctuates greatly because of significant salt water infiltration occuring at high tides.

Chlorine Usage

Applied - ppm	9.3	
Average Daily, tons	10.9	9,922 kg
Total for year, tons	3,992	3,622K kg

Chlorine Residual

Effluent - ppm	1.3

II - SLUDGE COLLECTION AND DIGESTION PROCESSES

DAILY AVERAGE

Raw Sludge

Total solids content % after thickening	6.2	

Added to Digesters

1000 gallons	99,967	378K Cu. Meters
1000 dry lbs.	51,629	23,419K kg

Volatile solids content, %	71	
Volatile solids content, 1000 dry lbs.	36,657	16,627K kg

Alkalinity	850	
pH	6.0	

Digester Sludge

Total solids content, %	2.7	
Withdrawn, 1000 gals.	108,306	410K Cu. Meters
Withdrawn, 1000 lbs.	24,359	11,049K kg
Volatile solids content, %	46	
Withdrwn, 1000 dry lbs.	11,205	5,083K kg
Alkalinity as calcium carbonate	2,500	
pH	6.9	

Digestion Efficiency

Reduction

Total solids destroyed, %	53
1000 dry lbs.	27,270 12,369K kg

Volatile solids destroyed, %	69
1000 dry lbs.	25,452 11,545K kg

DAILY AVERAGE

Digester Loadings

Based upon operation using two (2) primary tanks (4.3 M. Gal. capacity)

Detention Time, days	14.2
Unit loading rate, dry lbs./cu. ft./day	0.28
kg/cu. meter/day	4.48

Digester Sludge Gas

Produced, total 1000 cu. ft.	176,747
cu. meters	5,006K
cu. ft./lb. solid added	3.4
cu. meters/kg	0.21
cu. ft./lb. volatile added	4.8
cu. meters/kg	0.3
cu. ft./lb. solid destroyed	6.5
cu. meters/kg	0.4

Quality of Gas

Methane, %	61
Carbon Dioxide, %	39

Chemical Usage (Soda Ash)

Total for year (tons)	nil

INDUSTRIAL WASTE PROGRAM

The industrial waste program was officially started in February of 1973 to acquire information and data on industries within the 43 cities and towns which make up the district. The information requested on each industry inspected is a requirement of the NPDES Permits issued by the Environmental Protection Agency and State Division of Water Pollution Control to the Commission for Deer and Nut Island Sewage Treatment Plants.

The inspection program involves physical inspection of all industries in the district. Industries suspected of discharging a questionable waste are required to submit the results of analyses performed on representative samples of the process waste by an independent laboratory for review and evaluation. The results of analyses along with other pertinent information - (permit application, inspection reports on the industry) - are used to determine whether or not the wastes are acceptable to continue discharge into the Metropolitan District Commission sewer system.

Inspection of all known industries that are within the 43 cities and towns which make up the sewerage district have been completed to date. Some of the industries within these areas are not connected to the sanitary sewer system at this time; however, these industries were inspected so that a complete record of potential discharges into the sanitary sewer system is available.

As a result of the information obtained by the questionnaire survey and expanded industrial inspection program, 6000 industries have been inspected, 642 of which were found to be in violation of Metropolitan District Commission's Rules and Regulations ..., and are presently pretreating, implementing pretreatment and/or modifying their system or processes to comply with the established standards.

A random follow up inspection program has been instituted to insure that industries previously cited by the Division are either conforming to commission requirements or are progressing towards this goal.

The Metropolitan District Commission has executed a contract with Black and Veatch Consulting Engineers to assist Division personnel in completion of the industrial waste inspections, implementation of the permit program for industries and to develop and implement a User Charge program.

MONITORING PROGRAM

The monitoring program, developed to maintain an inventory of the industrial wastes currently entering the system and an elimination of unacceptable concentrations of toxic and potentially deleterious substances, involves sample collection by Metropolitan District Commission personnel and analysis of these industrial wastewater samples. The results of the analyses, in conjunction with information compiled

in the inspection and permit programs, further assists in the determination of the acceptability of wastewater discharge. GCA/Technology was awarded the contract to assist the Metropolitan District Commission in its Industrial Waste Monitoring Program by providing laboratory services for the analysis of industrial wastewater samples including such parameters as metals, volatile organics, pesticides, PCBs, base/neutral and acid extractable priority pollutants.

INDUSTRIAL PERMIT PROGRAM

The industrial permit program is mandated as a result of the promulgation on August 3, 1978 of the Metropolitan District Commission Sewer Use Rules and Regulations.

Industrial permits are granted for a specified period of time and require adherence to certain conditions which are stated in the permit. All permits require that changes in an industry's location, waste strength, or flow as well as any accidental discharges of prohibited or controlled material be reported to the Metropolitan District Commission.

The Metropolitan District Commission has classified industries into four categories according to the nature of their wastes. The categories are as follows:

1. industries requiring pretreatment
2. industries which have some toxic discharges but do not require pretreatment
3. industries which have non-toxic discharges in addition to sanitary flow
4. dry industries or industries with sanitary flow only

As of now these are the approximate number of permits that have been issued by category; Category 1 640; Category 2 489; Category 3 726; Category 4 2865.

GASOLINE IN PUBLIC SEWERS

A Sanitary Engineer is employed to inspect all newly constructed garages or other gasoline-using establishments to insure proper separators are installed and maintained. Occasionally, odors of gasoline are detected in the sewer and reported to the Department of Public Safety. A joint investigation and follow-through are made to eliminate this hazard.

During the fiscal year 28 new separators were connected to the local sewers that discharge into the Metropolitan System and none were disconnected. There are according to our records 4,623 separators in service at garages and other gasoline-using establishments.

SEPTAGE WASTE MONITORING & CONTROL PROGRAM

In July of 1974 the Metropolitan District Commission Sewerage Division sent letters to each of the 43 member cities and towns of the Sewerage District requesting information concerning the disposal of septic tank cleanings in its locality. Each member was asked to submit information on (1) the number of all authorized disposal sites or manholes in its community, (2) the origin of the waste (community waste only, Metropolitan District Commission member wastes), (3) the estimated quantity of waste discharged, and (4) a brief description of the monitoring and control programs used by the local authorities to assess the acceptability of the waste for discharge. This information was obtained to update our files and to determine local methods of control used to regulate scavenger service discharges of septic tank and cesspool wastes into the sewer system.

A septic tank waste monitoring program was conducted in 1974 and 1976 in selected towns to obtain the primary goal of categorizing septage waste and establishing certain parameter ranges including BOD, total suspended solids, and chlorine demand. This program also gave the Metropolitan District Commission the opportunity to randomly check to see if wastes of an industrial nature were being deposited in the septic tank disposal sites. As a result, some towns were requested to institute a procedure at the disposal site so as to aid the Metropolitan District Commission in eliminating industrial type discharge at these locations.

Several localities outside the Metropolitan District Commission have applied for and have been granted permission to discharge septage waste from their respective towns into the authorized disposal site of a member town. The Town of Tewksbury discharges septage waste via the Town of Wilmington, Holliston via Walpole and Framingham, Sharon via Walpole, Stoughton and Canton, Lincoln via Bedford and Framingham, Weston via Needham, Hingham via the sewered part of Hingham, and the Towns of Wrentham, Norfolk, and Mansfield discharge via Walpole.

The contractual agreements are issued on a yearly basis by the Metropolitan District Commission and require annual renewal. In addition, yearly acceptance is contingent upon receipt of progress reports at six month intervals outlining progress towards implementation of an acceptable alternate septage disposal method.

TABLE I

METROPOLITAN SEWERAGE DISTRICT

Areas and Populations

Table Shows Ultimate Contributing Areas and Present Estimated Populations Within the Metropolitan Sewerage District, as of December 31, 1980.

The Population of the Cities and Towns of the District, as given in the Table, is based on the State Census of 1975.

City of Town	Area (Square Miles)	Estimated Population
Arlington	4.64	50,223
Ashland	9.40	8,906
Bedford (1)	1.63	6,490
Belmont	3.79	29,135
Boston	39.19	639,098
Braintree	13.44	36,822
Brookline	5.33	53,150
Burlington	8.97	24,306
Cambridge	5.42	102,095
Canton	17.73	18,114
Chelsea	2.06	25,066
Dedham	9.54	26,924
Everett	2.91	39,713
Framingham	22.50	65,564
Hingham (2)	2.50	6,555
Holbrook	4.50	11,849
Lexington	15.77	32,477
Malden	4.23	55,814
Medford	5.98	60,702
Melrose	3.81	32,213
Milton	8.98	27,214
Natick	14.58	31,102
Needham	7.13	29,936
Newton	14.38	89,183
Norwood	10.14	31,316
Quincy	11.39	91,487
Randolph	6.25	29,206
Reading	9.01	23,696
Revere	5.55	41,292
Somerville	3.96	80,596
Stoneham	4.22	21,564
Stoughton	14.70	25,717
Wakefield	6.33	26,041
Walpole	19.99	18,504
Waltham	11.38	58,404
Watertown	3.80	36,075
Wellesley	9.89	26,593
Westwood	9.18	14,019
Weymouth	16.22	56,854
Wilmington	15.10	17,656
Winchester	5.31	22,672
Winthrop	1.59	20,359
Woburn	12.23	35,329
TOTALS	404.65	2,180,031

(1) Sewage for part of the town handled through the Town of Lexington under special contract.

(2) The Area and Population given is only for that part of the Town included in the Metropolitan Sewerage District.

TABLE II

TO DEER ISLAND

THE TOTAL AND CONTIRBUTING POPULATIONS ALONG WITH THE ULTIMATE SEWERED AREA OF EACH CITY OR TOWN CONTRIBUTING TO DEER ISLAND SEWAGE TREATMENT PLANT AS OF DECEMBER 31, 1980, ARE TABULATED BELOW

CITY OR TOWN	TOTAL POPULATION 1975 STATE CENSUS	CONTRIBUTING POPULATION	ULTIMATE SEWERED AREA SQUARE MILES
Arlington	50,223	50,124	4.64
Bedford	6,490	6,456	1.63
Belmont	29,135	28,038	3.79
Boston (Part of)	475,297	474,998	22.23
Brookline (Part of)	32,429	10,274	1.38
Burlington	24,306	22,080	8.97
Cambridge	102,095	101,906	5.42
Chelsea	25,066	25,057	2.06
Everett	39,713	25,480	2.91
Lexington	32,477	28,170	15.77
Malden	55,814	55,803	4.23
Medford	60,702	60,668	5.98
Melrose	32,213	32,145	3.81
Milton (Part of)	2,238	2,096	0.42
Newton (Part of)	38,893	38,034	6.27
Reading	23,696	19,144	9.02
Revere	41,292	39,479	5.55
Somerville	80,596	80,516	3.96
Stoneham	21,564	15,192	4.22
Wakefield	26,041	25,716	6.33
Waltham	58,404	58,381	11.38
Watertown	36,075	35,990	3.80
Wilmington	17,656	218	15.13
Winchester	22,672	20,270	5.31
Winthrop	20,359	10,922	1.59
Woburn	35,329	26,597	12.23
TOTALS	1,390,775	1,293,788	168.03

TABLE III

TO NUT ISLAND

THE TOTAL AND CONTRIBUTING POPULATIONS ALONG WITH THE ULTIMATE SEWERED AREA OF EACH CITY OR TOWN CONTRIBUTING TO NUT ISLAND SEWAGE TREATMENT PLANT AS OF DECEMBER 31, 1980, ARE TABULATED BELOW

CITY OR TOWN	TOTAL POPULATION 1975 STATE CENSUS	CONTRIBUTING POPULATION	ULTIMATE SEWERED AREA SQUARE MILES
Ashland	8,906	2,856	9.40
Boston (Part of)	163,801	163,673	16.96
Braintree	36,822	36,767	13.44
Brookline (Part of)	20,721	6,568	3.95
Canton	18,114	11,861	17.73
Dedham	26,924	22,571	9.54
Framingham	65,564	53,183	22.50
Hingham	6,555	4,887	2.50
Holbrook	11,849	1,049	4.50
Milton (Part of)	24,976	23,403	8.56
Natick	31,102	22,685	14.58
Needham	29,936	27,741	7.13
Newton (Part of)	50,290	49,180	8.11
Norwood	31,316	31,374	10.14
Quincy	91,487	91,455	11.39
Randolph	29,206	21,590	6.25
Stoughton	25,717	11,262	14.70
Walpole	18,504	5,704	20.16
Wellesley	26,593	23,144	9.89
Westwood	14,019	6,443	9.18
Weymouth	56,854	41,135	16.22
TOTALS	789,256	658,859	236.83

TABLE 17

METROPOLITAN DISTRICT COMMISSION

Location, Length and Sizes of Metropolitan Sewers with Public, Special and MDC Connections as of June 30, 1981

City or Town	Size of Sewers	Length in Miles	Public	Special	MDC
Arlington	10" to 66"	10.00	71	252	3
Ashland (4)	—	—	2	0	0
Bedford (6)	—	—	2	0	0
Belmont (1)	30" to 36"	—	2	0	0
BOSTON					
Boston (Proper)	10' to 11'-6"	0.43	2	0	0
Brighton	12" to 7'-0"x9'-4"	9.35	18	4	3
Charlestown	12" to 6'-7"x7'-5"	3.48	15	20	0
Deer Island	4' to 11'-6"	4.46	4	2	2 (3)
Dorchester	2'-6"x2'-7" to 3'-4"	2.90	19	13	1
East Boston	12" to 10'-0"	6.78	26	10	0
Hyde Park	30" to 10'-7"x11'-7"	4.73	20	8	0
Roxbury	3'-9" to 10'-0"	5.56	17	7	0
South Boston	10'-0" to 11'-6"	5.39	2	0	1
West Roxbury	12" to 9'-3"x10'-2"	10.35	36	12	2
Braintree	8" to 48"	4.26	9	2	0
Brookline	8" to 9'-0"	2.33	7	0	0
Burlington (5)	—	—	1	0	0
Cambridge	15" to 7'-4"x11'-6"	12.57	69	23	0
Canton	18" to 60"	7.32	17	32	0
Chelsea	15" to 11"-3"x11'-3"	6.33	30	11	1
Dedham	18" to 72"	8.38	17	7	0
Dover (2)	48"	0.99	0	1	0
Everett	52" to 11'-3"x11'-3"	5.49	12	7	1
Framingham (1)	42"	0.01	3	0	0
Hingham	12" to 24"	0.14	1	0	0
Holbrook	24" to 30"	1.52	2	0	0
Hull (2)	12" to 60"	2.58	0	0	0
Lexington	15" to 18"	2.44	9	0	0
Malden	15" to 4'-6"x4'-10"	8.63	72	166	9
Medford	10" to 9'-3"x9'-3"	13.00	14	12	11
Melrose	10" to 4'-6"x4'-10"	6.09	45	145	1
Milton	8" to 11'-0"x12'-0"	7.22	37	4	0
Natick	42" to 48"	5.15	19	4	0
Needham	2'-0"x2'-3" to 54"	3.62	9	12	0
Newton	15" to 72"	5.08	24	25	1
Norwood	30" to 54"	4.67	12	14	0
Quincy	16" to 11'-3"x12'-6"	9.31	46	7	2
Randolph (1)	15" to 33"	0.01	2	0	0
Reading	16" to 63"	0.06	2	0	0
Revere	15" to 48"	0.14	3	0	0
Somerville	10" to 6'-5"x7'-2"	4.73	21	24	3
Stoneham	10" to 36"	4.04	18	5	1
Stoughton (1)	20"	—	1	0	0
Wakefield	12" to 30"	0.70	7	3	0
Walpole	2'-6"x2'-9"	—	2	0	0
Waltham	30" to 42"x48"	1.69	3	0	0
Watertown	12" to 72"	1.47	8	7	0
Wellesley	2'-0"x2'-3" to 48"	0.10	4	0	0
Westwood	30" to 36"	0.30	3	0	0
Weymouth	12" to 4'-9"x5'-0"	3.73	10	6	0
Wilmington (1)	30"	—	2	0	0
Winchester	15" to 5'-6"x5'-9"	14.41	36	27	1
Winthrop	9'-0" to 10'-0"	3.23	15	4	0
Woburn	15" to 4'-2"x4'-5"	5.54	7	9	0
	TOTALS	228.0	866.	397	42

(1) The Metropolitan Sewers extend but a few feet into the Town of Belmont, Framingham, Randolph, Stoughton, Walpole and Wilmington.

(2) Dover and Hull are not part of the Metropolitan Sewer District.

(3) Temporary.

(4) Ashland connected to MDC through Framingham sewers.

(5) Burlington connected to MDC through Woburn sewers.

(6) Bedford connected to MDC through Lexington sewers.

METROPOLITAN DISTRICT COMMISSION
SEWERAGE DIVISION

TABLE V

RATIOS OF CONTRIBUTION ON THE BASIS OF CHAPTER 814, ACTS OF 1975, SECTION 6 AND THE CONTRIBUTING POPULATION AS DETERMINED BY THE METROPOLITAN DISTRICT COMMISSION, SEWERAGE DIVISION

ITY R OWN	CONTRIBUTING POPULATION	FLOW FROM MAJOR INDUSTRIES (>50,000 GPD)	POPULATION EQUIVALENT OF MAJOR INDUSTRIES	TOTAL CONTRIBUTING POPULATION AND POPULATION EQUIVALENT	RATIOS FOR OPERATIO AND MAINTENANCE FISCAL YEAR ENDING JUNE 30, 1981
RLINGTON	47438.	0.000	0.	47438.	0.022095
SHLAND	2933.	0.400	2266.	5199.	0.002421
EDFORD	6886.	1.365	7733.	14619.	0.006809
LMONT	26613.	0.200	1133.	27746.	0.012923
ON	561285.	19.582	110930.	672215.	0.313096
RAINTREE	35610.	0.228	1292.	36902.	0.017188
ROOKLINE	54732.	0.116	657.	55389.	0.025798
URLINGTON	19376.	0.507	2872.	22248.	0.010362
AMBRIDGE	94845.	5.973	33836.	128681.	0.059935
ANTON	11891.	0.516	2923.	14814.	0.006900
HELSEA	25304.	0.344	1949.	27253.	0.012693
EDHAM	21225.	0.060	340.	21565.	0.010044
VERETT	37009.	2.112	11964.	48973.	0.022810
RAMINGHAM	52807.	1.076	6095.	58902.	0.027435
INGHAM	5062.	0.000	0.	5062.	0.002358
OLBROOK	991.	0.000	0.	991.	0.000462
EXINGTON	25352.	1.096	6209.	31561.	0.014700
DEN	53119.	0.121	685.	53804.	0.025060
ORD	57786.	0.303	1716.	59502.	0.027714
ELROSE	29905.	0.075	425.	30330.	0.014127
ILTON	24127.	0.000	0.	24127.	0.011238
ATICK	21507.	0.448	2538.	24045.	0.011199
EEDHAM	23883.	0.258	1462.	25345.	0.011805
EWTON	81531.	0.739	4186.	85717.	0.039924
ORWOOD	29562.	0.550	3116.	32678.	0.015220
UINCY	84319.	1.186	6719.	91038.	0.042402
ANDOLPH	20825.	0.000	0.	20825.	0.009700
EADING	18210.	0.051	289.	18499.	0.008616
EVERE	40514.	0.000	0.	40514.	0.018870
OMERVILLE	76985.	0.202	1144.	78129.	0.036390
NEHAM	21124.	0.000	0.	21124.	0.009839
UGHTON	12046.	0.000	0.	12046.	0.005611
AKEFIELD	24571.	0.055	312.	24883.	0.011590
ALPOLE	5695.	2.107	11936.	17631.	0.008212
ALTHAM	59548.	3.377	19130.	78678.	0.036646
ATERTOWN	34212.	0.239	1354.	35566.	0.016565
ELLESLEY	23427.	0.000	0.	23427.	0.010911
ESTWOOD	5747.	0.000	0.	5747.	0.002677
EYMOUTH	38309.	0.225	1275.	39584.	0.018437
ILMINGTON	210.	0.907	5138.	5348.	0.002491
INCHESTER	18507.	0.051	289.	18796.	0.008755
INTHROP	19198.	0.000	0.	19198.	0.008942
OBURN	27579.	2.344	13278.	40857.	0.019030
ALS	1881805.	46.813	265191.	2146996.	1.000000

REVISED 10-20-81

METROPOLITAN DISTRICT COMMISSION
SEWERAGE DIVISION

TABLE VI

RATIOS OF CONTRIBUTION ON THE BASIS OF CHAPTER 814, ACTS OF 1975, SECTION 5 & 5A AND THE CENSUS RETURNS OF 1975 AS DETERMINED BY THE METROPOLITAN DISTRICT COMMISSION, SEWERAGE DIVISION

CITY OR TOWN	CENSUS 1975	FLOW FROM MAJOR INDUSTRIES (> 50,000 GPD)	POPULATION EQUIVALENT OF MAJOR INDUSTRIES	TOTAL CENSUS AND POPULATION EQUIVALENT	RATIOS FOR PRINCIPAL AND INTEREST FISCAL YEAR ENDING JUNE 30, 1982
ARLINGTON	50223.	0.000	0.	50223.	0.020490
ASHLAND	8906.	0.400	2266.	11172.	0.004558
BEDFORD	12314.	1.365	7733.	20047.	0.008179
BELMONT	29135.	0.200	1133.	30268.	0.012349
BOSTON	639098.	19.582	110930.	750028.	0.306003
BRAINTREE	36822.	0.228	1292.	38114.	0.015550
BROOKLINE	53150.	0.116	657.	53807.	0.021953
BURLINGTON	24306.	0.507	2872.	27178.	0.011088
CAMBRIDGE	102095.	5.973	33836.	135931.	0.055458
CANTON	18114.	0.516	2923.	21037.	0.008583
CHELSEA	25066.	0.344	1949.	27015.	0.011022
DEDHAM	26924.	0.060	340.	27264.	0.011123
EVERETT	39713.	2.112	11964.	51677.	0.021084
FRAMINGHAM	65564.	1.076	6095.	71659.	0.029236
HINGHAM	6555.	0.000	0.	6555.	0.002674
HOLBROOK	11849.	0.000	0.	11849.	0.004834
LEXINGTON	32477.	1.096	6209.	38686.	0.015783
MALDEN	55814.	0.121	685.	56499.	0.023050
MEDFORD	60702.	0.303	1716.	62418.	0.025466
MELROSE	32213.	0.075	425.	32638.	0.013316
MILTON	27214.	0.000	0.	27214.	0.011103
NATICK	31102.	0.448	2538.	33640.	0.013725
NEEDHAM	29936.	0.258	1462.	31398.	0.012810
NEWTON	89183.	0.739	4186.	93369.	0.038094
NORWOOD	31316.	0.550	3116.	34432.	0.014048
QUINCY	91487.	1.186	6719.	98206.	0.040067
RANDOLPH	29206.	0.000	0.	29206.	0.011916
READING	23696.	0.051	289.	23985.	0.009786
REVERE	41292.	0.000	0.	41292.	0.016847
SOMERVILLE	80596.	0.202	1144.	81740.	0.033349
STONEHAM	21564.	0.000	0.	21564.	0.008798
STOUGHTON	25717.	0.000	0.	25717.	0.010492
WAKEFIELD	26041.	0.055	312.	26353.	0.010752
WALPOLE	18504.	2.107	11936.	30440.	0.012419
WALTHAM	58404.	3.377	19130.	77534.	0.031633
WATERTOWN	36075.	0.239	1354.	37429.	0.015271
WELLESLEY	26593.	0.000	0.	26593.	0.010850
WESTWOOD	14019.	0.000	0.	14019.	0.005720
WEYMOUTH	56854.	0.225	1275.	58129.	0.023716
WILMINGTON	17656.	0.907	5138.	22794.	0.009300
WINCHESTER	22672.	0.051	289.	22961.	0.009368
WINTHROP	20359.	0.000	0.	20359.	0.008306
WOBURN	35329.	2.344	13278.	48607.	0.019831
TOTALS	2185855.	46.813	265191.	2451046.	1.000000

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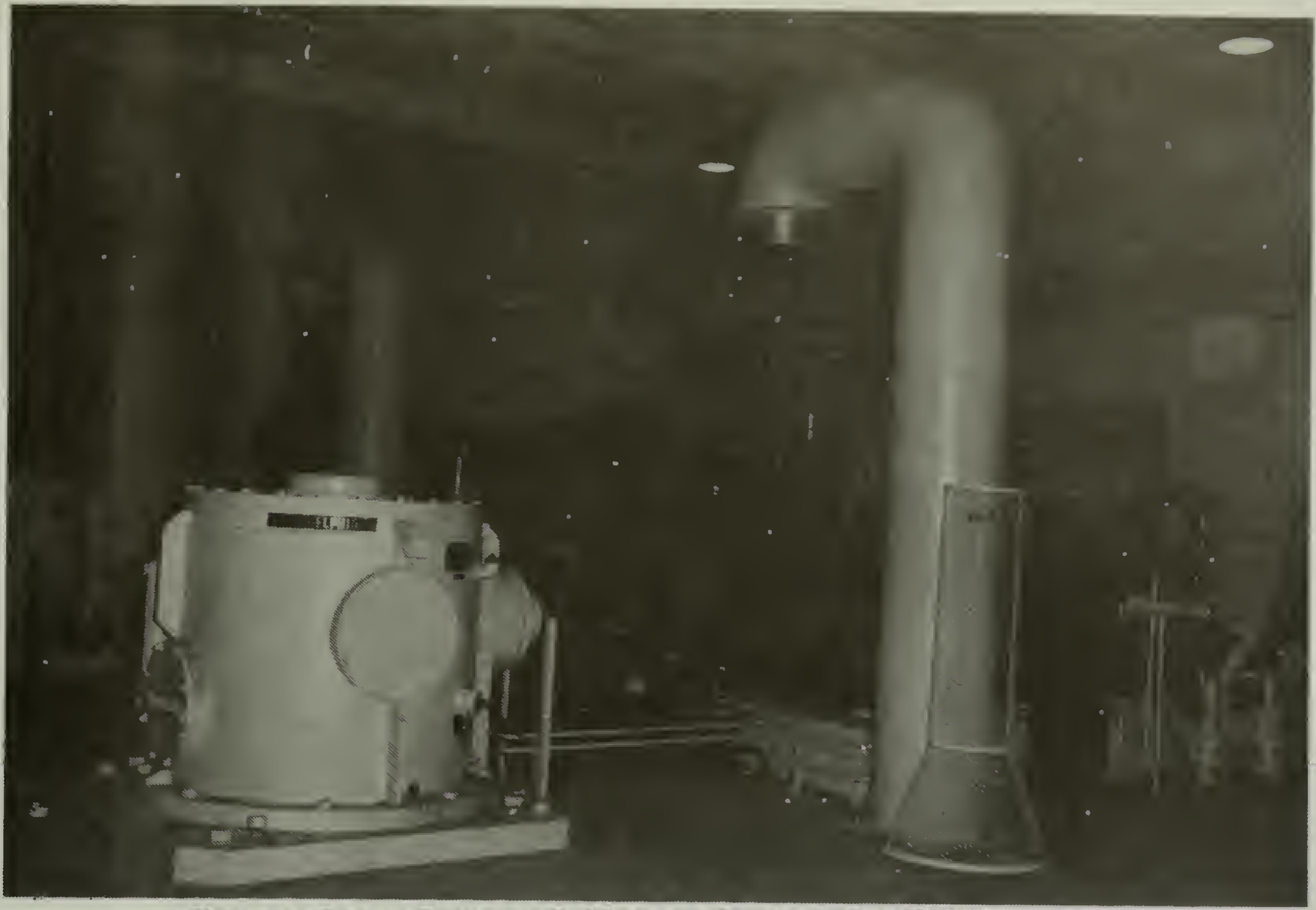


Charles River Estuary Pollution Control Facility

The above picture is one of the four (4) variable speed drive units, which controls the rate of pumping during wetweather flow.

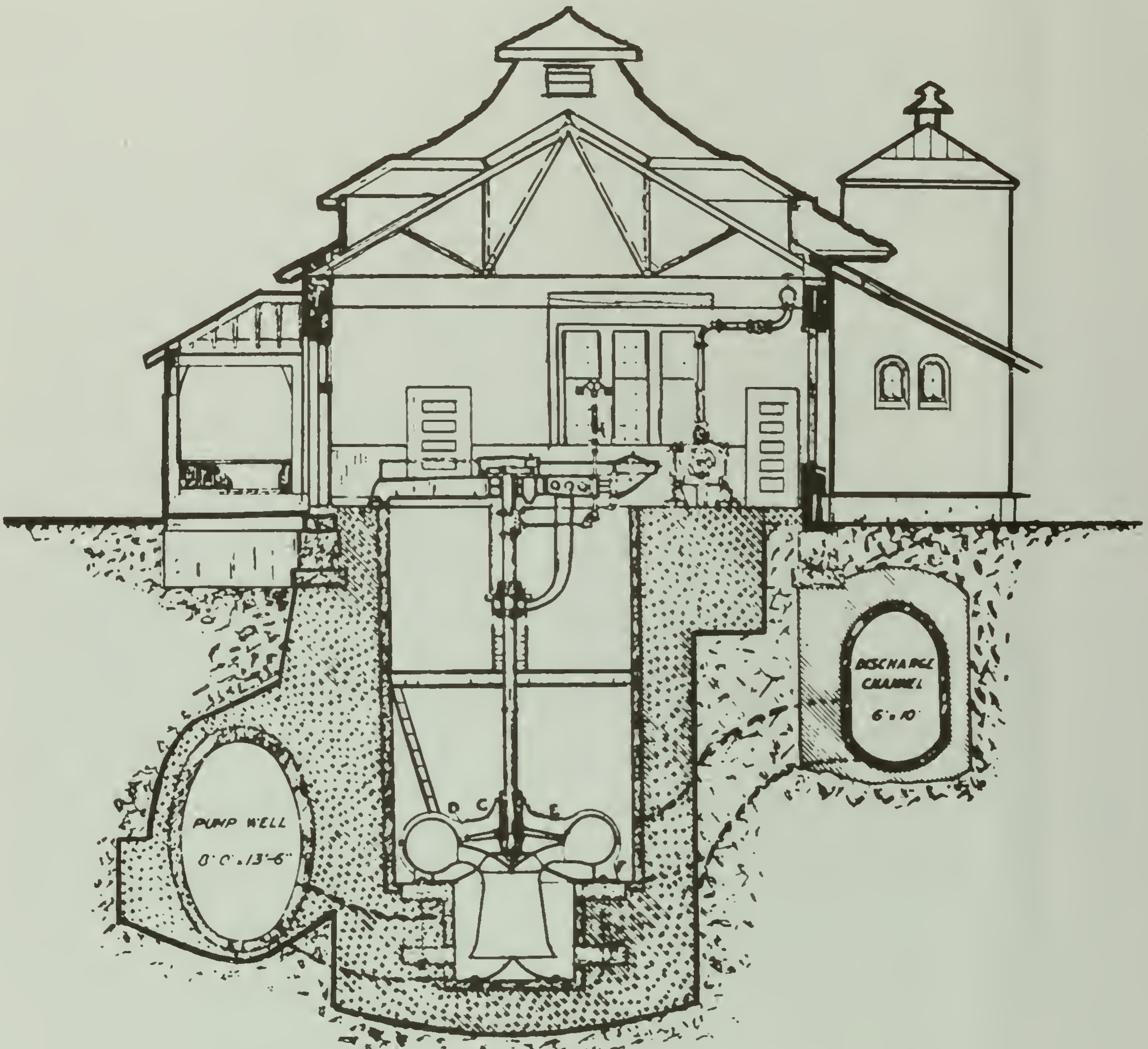
On the outside cover is a cross section of the Deer Island Pumping Station, Circa 1899. This diagram shows the location of the intake and discharge channels in relation to the Reynolds-Corliss driven centrifugal pumps.

No longer in operation, it still stands at Deer Island as a reminder of the Division's earlier years.

This Annual Report was prepared and edited by Phil Carbone, arranged and typed by Carol Swirbalus.

Information supplied to this Annual Report is credited to the following: K. Donovan, M. Besta, E. Carpman, L. O'Shea, D. Mello, C. F. Mac Kinnon, E. Mogan, W. Neimiec, T. Harrow, and G. Riley.

Cover Designed and Prepared by A.J. Sweeney



SECTION THROUGH PUMP
DEER ISLAND STATION